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(54) SUSPENDING LIQUIDS

(71) We, UNILEVER LIMITED, a company organised under the laws of Great Britain, of Unilever House, Blackfriars, London E.C.4, England, do hereby declare the invention for which we pray that a patent may be granted to us and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to aqueous suspending detergent liquids which are anionic in character. These liquids have the property of stably suspending discrete entities such as particulate matter, for example particles of silica, quartz, felspar, kaolin, carborundum, encapsulated material, solid germicides and solid soil anti-redeposition additives, globular material for example immiscible liquids and gaseous matter, for example bubbles of immiscible gas. "Stably suspending" means that the liquids/particulate matter liquid or gas compositions can be stored at room temperature for at least several weeks without separation into layers. These compositions are also pourable.

Hitherto, suspending liquids have been of the type described in British patent 882,569 which concerns a suspending medium comprising an anionic detergent, a fatty acid alkanolamide and a non-acidic alkali metal salt of a phosphoric acid of molecular weight below 400. A further type of suspending liquid is described in British patent 955,081, wherein the liquid consists essentially of water, an anionic detergent and a nonionic detergent. These liquids have relatively large proportions of nonionic surfactant in the detergent content and have the disadvantages of lower foam production and greater chemical reactivity as compared with the substantially anionic liquids of the present invention. The reduced chemical reactivity is of importance, because the suspending liquids of this invention therefore allow more ingredients to be included. Some nonionic surfactants, for example ethanolamides, are far from stable in presence of hypochlorite. Furthermore, the present liquids can be prepared in higher active detergent contents.

The liquids of the present invention suspend particulate matter because of the rheological nature of the liquids. This nature is characterised by an increase in "apparent" viscosity as the shear rate decreases. The stress-strain curves of the liquids intercept the stress axis at a finite value designated a yield value, (Meyer and Cohen, J. Soc. Cosmetic Chemists, 1959, *10*, May.)

Accordingly, the present invention provides a suspending aqueous detergent liquid comprising (a) water, (b) a water soluble anionic organic detergent, (c) an unionised amphiphilic compound wherein (c) is present in amount such that the mixture of (a), (b) and (c) has an apparent viscosity of not less than 0.2 poise at 1100 seconds^{-1} shear rate, and not more than 3.5 poise at 7 seconds^{-1} and has non-Newtonian flow character; and (f) a polarisable organic agent as defined below, present in amount such that the resulting liquid has a yield value of at least 2 dynes per sq. cm. measured in the shear rate range of 10^{-2} to 10^{-4} seconds^{-1}.

By "non-Newtonian" flow character is meant that the apparent viscosity of the liquid changes with shear rate.

The shear rates in the range specified in relation to the yield value are very low because, at it will be appreciated, extrapolation to zero shear at these low rates gives a closer approximation to the true yield value than do measurements at the usual shear rates of 1—1000 seconds^{-1} (Meyer and Cohen, J. Soc. Cosmetic Chemists, 1959, *10* May). Viscometers are available which will operate at the low shear rates of 10^{-2} to 10^{-4} seconds^{-1}. (Lucassen-Reynders et al, J. Phy. Chem. 1963, *67*, 731).

A typical plot of apparent viscosity against shear rate of one of the simple embodiments of

the invention, viz. an aqueous solution of 20% sodium lauryl sulphate selected as (b), the anionic organic detergent, and 5% lauric acid selected as (c) the amphiphilic compound is as follows:

Shear rate (seconds^{-1})	7	14	21	42	63	190	380	570	1140
Apparent viscosity (poise)	2.14	2.14	1.42	1.0	0.7	0.5	0.3	0.25	0.2

When either of the apparent viscosity/shear rate values specified in the above specified range is not obtained then pourability and stable suspending properties are not possessed by the composition after addition of (f) the polarisable organic agent.

The suspending aqueous detergent liquids of the present invention preferably comprise any one of the following several embodiments, viz. liquids having any of the following compositions, (d) being an electrolyte and (e) a viscosity modifier as described later.

(a)	(b)	(c)	(d)	(e)	(f)
present	10—25	2—10	nil	nil	0.5—3
„	5—25	2—10	0.5—10	nil	0.5—3
„	10—35	2—10	nil	0.5—10	0.5—5
„	5—35	2—10	0.5—10	0.5—10	0.5—5
„	10—35	2—10	up to 10%	up to 25%	3—10

(percentages being by weight of the total liquid)

The present liquids must have a yield value of at least 2 dynes/sq. cm. When such liquids are to be used to prepare stable suspensions of particulate matter which will also remain pourable, it is necessary to ensure that the yield value exceeds the stress exerted by the particles. The forces involved in shaking or pouring the composition from a container must exceed the yield value and thus the structure of the liquid breaks down to give a pourable composition. When the shaking or pouring activity ceases, the structure reforms and the particles are again maintained in stable suspension.

The anionic organic detergent of this embodiment is soluble in water at 25°C. to the extent that the critical micelle concentration is exceeded. Subject to this proviso, suitable anionic organic detergents are the alkyl sulphates, wherein the alkyl radical which may be linear or branched; the sulphated ethoxylated alkyl phenols; the sulphated fatty esters of acids or alcohols; the alpha-olefin sulphonates; the ethoxylated alkyl sulphates, the molecules of ethylene oxide per mol of sulphate preferably ranging from 0—10; the alkyl aryl sulphonates, preferably sodium dodecyl benzene sulphonate, the alkyl sulphosuccinates; the zwitterionic materials which are anionic in the environment of the present liquid, i.e. that the pH of the liquid is such that the zwitterionic material is in its anionic form, for example, sodium hydroxy alkyl-N-methyl taurates, or the oxyderivative of this taurate; and the soaps, for example, potassium soaps of oleic and coconut oil fatty acids. These detergents may be used in alkali metal form, viz. lithium, sodium, potassium or ammonium. Mixtures of these anionic synthetic organic detergents may be used.

Amphiphilic compounds are substances which contain both a polar water soluble group and a water insoluble group of size sufficient to confer hydrophobic properties on the molecule as a whole—see Chemistry & Industry, November 4 1961, p. 1765 A. S. C. Lawrence. They must be present in unionised form, if the liquids containing them are to have a suspending property.

Suitable amphiphilic compounds are the saturated fatty acids of formula RCOOH wherein R is alkyl from 8—14 carbon atoms, preferably lauric or decoic acids; the saturated aliphatic alcohols ROH wherein R is alkyl having 8—14 carbon atoms, preferably octyl to lauryl alcohol; amines of RNH_2 wherein R is alkyl having 8—14 carbon atoms, preferably decylamine; amine oxides; sulphoxides and zwitterionic surfactants. Suitability is, of course, assessed having regard to the above-mentioned ionisation character, and the obtain-

ing of the specified apparent viscosity characteristics. For example, lauric acid is not suitable for inclusion in a liquid formulated to have a pH of 9 or more because it ionises and is therefore not an amphiphile.

The amphiphilic compound is solubilised by the anionic organic detergent. By varying the concentration of the amphiphilic compound within the preferred range, 2—10% by weight of the total liquid, the rheology of the liquid may be varied so as to obtain liquids which have different degrees of pourability. A guide to the concentration of amphiphilic compound which is required for a given solution of water soluble anionic organic detergent can be found by way of the "second CMC" of the anionic organic detergent. The term "second CMC" denotes the concentration of the detergent at which its aqueous solution begins to change from spherical micelles into cylindrical micelles. This is determined by the change in the slope of the curve plotted of apparent viscosity vs detergent concentration in water at 25°C (reference E. K. Wall and Holmberg, Acta, Chem. Scand. 1965, *19*, 455—68). The higher the second CMC, the greater the concentration of amphiphilic compound required to produce a liquid having suspending properties, in accordance with the following guide line; the relationship between the 2nd CMC value of the anionic organic detergent in water, and the % amphiphilic compound by weight of total liquid as follows:

2nd CMC value	<12	12—18	>18
% amphiphilic compound	2—4	3—7	6—10

When a mixture of anionic organic detergents is used, the second CMC should be determined for the mixture, before applying the above guide line. It will be appreciated that impurities in the anionic organic detergent will affect the second CMC.

Where an amphiphilic compound according to the invention is already present in the anionic organic detergent as an impurity, then its presence must be taken into account in formulating suspending liquids in accordance with the ranges specified above. For example if commercial sodium dioctyl sulphosuccinate is selected as the anionic organic detergent, its inevitable content of octyl alcohol (an amphiphilic compound suitable for the present liquids) must be taken into account in considering the concentration of amphiphilic compound to be used.

The polarisable organic agent is defined as being soluble in dodecane to at least 10% by weight at 25°C and soluble in distilled water at 25°C to an extent lying in the range 0.02—2% weight/weight. This agent controls the yield value within any one liquid; increasing the concentration of this agent leads to an increase in the yield value and thus confers greater suspending power on the liquid.

Suitable polarisable organic agents are benzene, chlorobenzene, dipentene and saffrole.

When the concentration of water soluble anionic organic detergent in the suspending aqueous liquids of the invention lies in the range 10—25% by weight of liquid then the concentration of amphiphilic compound and polarisable organic agent can be selected within the ranges of 2—10% and 0.5—3% respectively by weight of total liquid.

It is believed that the anionic detergent dissolves in the water to form charged micelles, i.e. small groups of anionic organic detergent monomers organised such that their exteriors are made up of the hydrophilic groups of the individual molecules or ions, the hydrophobic portions being orientated inwards. The amphiphilic compound is solubilised in the micelles between the anionic organic detergent monomers and thus reduces the charge density at the surface of the micelle. When the polarisable organic agent is added to the mixture of water-anionic organic detergent-amphiphile compound it is thought to adsorb at the micelle-water interface and to increase the van der Waals' forces of interaction between micelles which leads to development of rheological properties such that the liquid is able to suspend particulate matter stably over length periods of time.

When the concentration of anionic organic detergent is required to be below 10%, then the suspending properties can be maintained by including an electrolyte, preferably in amount 0.5—10% by weight of liquid. Such an amount of electrolyte enables the anionic organic detergent level to be reduced by 5% by weight of liquid without any loss in suspending properties. The electrolyte is believed to alter the micelle form of the anionic organic detergent, thus decreasing the second CMC and promoting the formation of the cylindrical micelles.

Electrolyte may, if desired, be added to liquids containing 10—25% water-soluble anionic organic detergent. Reduction in the amount of amphiphilic compound essential to obtain suspending properties may then result, with economic advantage.

However, the well known effect of reduction in solubility of anionic organic detergents in water, which is caused by electrolyte addition, must be borne in mind. The selection of the anionic organic detergent should take account of this effect, by selecting a sufficiently soluble anionic organic detergent whenever an electro-

lyte is desired to be included in the liquid, especially when a high concentration of electrolyte is required for some specific reason, e.g. phosphates as a sequestrant.

The apparent viscosity of any mixture of water, anionic detergent amphiphilic compound and electrolyte should lie within the prescribed range of between 0.2 poise at 1100 seconds^{-1} and 3.5 at 7 seconds^{-1}. It is not possible to lay down precise limits for the amount of electrolyte to be included in any given aqueous solution of selected anionic organic detergent, because the effect of the electrolyte upon the micellar interaction does not become apparent until the amphiphilic agent has been added. However, the foregoing definition of the essential viscosity characteristics of the mixture of water, anionic detergent, electrolyte and amphiphilic compound is of substantial value in formulating a suspending, pourable liquid. The liquids of this embodiment of the invention include 5—25% water soluble anionic organic detergent, 2—10% amphiphilic compound, 0.5—3% polarisable organic agent 0.5—10% electrolyte and water.

Suitable electrolytes are alkali metal halides, sulphates, carbonates, borates, silicates or phosphates. Organic substituted ammonium halides may be used.

The present invention is concerned also with liquids having an anionic organic detergent content more than 25%, viz. up to 35% by weight of the total liquid. The specification has explained the criticalities of the formulation of these liquids up to the anionic organic detergent level of 25%. Beyond this, the viscosity becomes increasingly greater and pouring more difficult. To reduce this viscosity, whilst retaining the suspending property, a viscosity modifier, for example ethanol, methanol, and diethylene glycol monoethyl ether, may be included. The quantity used will probably be in the range ½—10% by weight of the total liquid. Any tendency towards phase separation can be avoided by increasing the amount of polarisable organic agent. The amount of viscosity modifier may be assessed by way of achievement of the prescribed viscosity characteristics from the liquid resulting after mixing the water, anionic organic detergent, amphiphilic compound and viscosity modifier. This aspect of the present invention therefore, concerns suspending liquids comprising 10—35% anionic organic detergent, 2—10% amphiphilic compound, 0.5—10% alcohol as viscosity modifier, and 0.5—5% polarisable organic agent.

Liquids with an anionic organic detergent content of 5—35% by weight of total liquid may be obtained by incorporating both a viscosity modifier and an electrolyte, each in amount of 0.5—10% by weight of total liquid. These are prepared in a similar way to the previously described suspending liquids. The viscosity characteristics of the anionic detergent, amphiphilic compound and electrolyte solution are adjuncted with the viscosity modifier until the prescribed viscosity characteristics are obtained. Addition of a polarisable organic agent in amount of 0.5—5% by weight of total liquid will then produce a suspending, pourable, liquid. The precise amount to be added in any given liquid will be determined according to the minimum yield value of 2 dynes per sq. cm. The present invention is also concerned with this foregoing embodiment.

In these liquids which include both electrolyte and viscosity modifier, the problem of solubility of the selected anionic organic detergent will, if present, show itself in salting-out of the anionic organic detergent, when the detergent, amphiphilic compound and electrolyte are mixed. If a sufficiently soluble detergent is not otherwise suitable, less electrolyte must be used.

It has now been found, further, that liquids which have enhanced cleaning ability and yet retain their pourable, and suspending properties can be produced, according to the above-described guide lines if they comprise (i) 10—35% water soluble anionic organic detergent, 2—10% amphiphilic compound, up to 10% electrolyte, up to 25% viscosity modifier and 3—10% polarisable agent, all by weight of total liquid.

Production of the pourable suspending liquids of the present invention is preferably as follows: the selected water-soluble anionic organic detergent is dissolved in water and a plot of apparent viscosity against detergent concentration is constructed to determine the second CMC. This, as explained earlier, indicates the approximate concentration range of amphiphilic compound required. The selected anionic organic detergent is then dissolved in water at the required concentration and the amphiphilic compound in amount in accordance with the earlier guide line ranges is added to this solution which is warmed to solubilise the compound. The amphiphilic compound is added within the range until the viscosity characteristics of the mixture of water, anionic organic detergent and amphiphilic compound are non-Newtonian, and such that the apparent viscosity varies within the range 0.2 to 3.5 poise in the shear rate region 1100 to 7 seconds^{-1}. Addition of polarisable agent in amounts selected to give a resulting mixture having a yield value of at least 2 dynes per sq. cm. at shear rates in the range 10^{-2} to 10^{-1} seconds^{-1} will then give a pourable suspending liquid.

Pourable suspending liquids which include electrolyte and/or viscosity modifier may be obtained by adjusting the viscosity characteristics of the anionic organic detergent - amphiphilic compound-water mixture with the viscosity modifier or the electrolyte or combination of alcohol and electrolyte so that the

requisite viscosity characteristics, i.e. non-Newtonian flow and falling within the specified apparent viscosity/shear rate range, are attained. Addition of the polarisable agent to this mixture in amount within the range specified continues until the liquid having a yield value of at least 2 dynes per sq. cm. is obtained. In general, the anionic organic detergent is selected and the amphiphilic compound, these are retained at the constant desired level and the apparent viscosity values are attained by varying the viscosity modifier and/or electrolyte.

This invention is also concerned with compositions comprising stable suspensions of 5—40% by weight of total composition of particulate matter within the suspending aqueous detergent liquids as above defined and described.

The particles which can be stably suspended in the foregoing liquids of the present invention may vary over a wide range of particle sizes from 2 microns to 5 mm depending upon the density difference between the suspending liquid and the particles to be suspended, and also, as explained earlier, depending on the yield value relationship.

A guide to the maximum particles size these liquids will suspend stably may be obtained from the equation $D(d_s-d_o)=150$. d_s is the density in gramms per cc of the particles. d_o is the density in gramms per cc of the suspending liquid and D is the maximum diameter in microns of the particles that can be stably suspended.

Although ample guidance has been given above, as to the production of suspending detergent liquids, further amplification will be found by way of illustrative Examples. All percentages are by weight of total liquid. The designation C means comparative, and those liquids designated C lie outside the present invention, S means suspending, and EO means ethylene oxide.

In all the following Examples the mixture of water, anionic organic detergent, amphiphilic compound, and, where included, the electrolyte and the viscosity modifier, possessed non-Newtonian flow properties and had an apparent viscosity of not less than 0.2 poise at 1100 seconds^{-1} and not more than 3.5 poise at 7 seconds^{-1}.

Example 1—12—illustrative of the embodiment comprising water, anionic organic detergent, amphiphilic compound and polarisable agent.

Example No.	C	1	2	3	4	5	6	7	8	9	10
Sodium lauryl sulphate	5	10	15	15	15			20	20	20	20
Sodium lauryl ether (3EO) sulphate						15	15				
Lauric acid						3					5
Lauryl alcohol	5	5	5	6	7		6	5	6	5	
Benzene	1.0	1.2	0.9	0.9	0.9	0.7		1.3	0.9	0.9	1.3
Dipentene							0.9				
Water	← to 100% →										
Suspending properties	Non-suspending	S	S	S	S	S	S	S	S	S	S

Example No.	11	12	C	C
Sodium lauryl sulphate		22.5	27.5	30
Sodium lauryl ether (3EO) sulphate	20			
Lauric acid	5	5	5	5
Benzene (c)	0.9	1.8	1.8	0.7
Water	← to 100% →			
Suspending properties	S	S	non-suspending	

Examples 13—17 - illustrate the effect of inclusion of electrolyte on the liquids of the type of Examples 1—12.

Example No.	13	14	15	16	17
Sodium lauryl sulphate	5	5			
Sodium lauryl ether (3EO) sulphate			15	15	25
Lauryl alcohol	5		4	5	5
Decoic acid		5			
Dipentene			1.8	1.5	1.8
Benzene	0.5	0.9			
Sodium chloride	1	1	2	1	1
Water	← to 100% →				
Suspending properties	S	S	S	S	S

Examples 18—21 - illustrate the effect of inclusion of viscosity modifier on the liquids of the type of Examples 1—12.

Example No.	18	19	20	21
Sodium lauryl sulphate	15	20	25	27.5
Lauric acid	7	5	4	5
Benzene	0.9	1.8	1.8	1.8
Ethanol	3	2	5	3.2
Water	← to 100% →			
Suspending properties	S	S	S	S

Examples 22—27 - illustrate the effect of the inclusion of both electrolyte and viscosity modifier.

Example No.	22	23	24	25	26	27
Sodium lauryl ether (3EO) sulphate	25	25	24.1	22.7	22.3	27.6
Lauryl alcohol	5	3	3	2.75	2.7	3.4
Dipentene	1.8	1.8	2	5.5	7.2	2.25
Sodium chloride	3	6	—	—	—	9
Ammonium chloride	—	—	9	8.3	8.1	—
Ethanol	7	3	8	9.25	9.0	5.6
Water	to 100% →					
Suspending properties	S	S	S	S	S	S

The foregoing Examples 1—27 show, in practical terms, the principles set out in the specification by which anionic organic detergent liquids having a suspending power can be formulated.

The following Examples 28—37 are typical of a wide variety of simple, aqueous compositions having suspending properties, consisting essentially of an anionic organic detergent, amphiphilic compound and polarisable agent. The balance of the composition is water; small amounts of optional ingredients such as a foam booster, may be added, provided that due regard is paid to their effect on the suspending property of the liquid.

No.	Anionic organic detergent	Amphiphilic compound	Polarisable organic agent
28	15 sodium dodecyl benzene sulphonate	3 lauric acid	0.9 benzene
29	20 sodium hydroxy alkyl (C14—16) methyl taurate	4.5 octyl alcohol	0.5 dipentene
30	20 potassium oleate	4 lauric acid	1.8 benzene
31	20 potassium oleate	5 lauric acid	1.3 benzene
32	20 potassium oleate	6 lauric acid	1.3 benzene
33	20 sodium lauryl sulphate	5 decoic acid	2.5 benzene
34	20 sodium lauryl sulphate	5 myristic acid	2.5 benzene
35	15 sodium dodecyl benzene sulphonate	3 myristic acid	0.9 benzene
36	20 sodium lauryl sulphate	5 palmitic acid	3.0 benzene
37	15 sodium lauryl sulphate	5 octyl alcohol	0.9 benzene

The liquids of Examples 28—37 are all capable of stably suspending particulate matter of particle size from 2 microns to 5 mm (depending upon the density of particles and liquid) for very long periods of time at room temperature.

The following Examples 38—46 demonstrate more complex detergent liquid compositions having suspending properties, in which the anionic organic detergent is the mixture

10 sodium hydroxy alkyl ($C_{14—16}$) methyl taurate
11 sodium lauryl ether (3EO) sulphate
3 sodium lauryl sulphate

No.	Amphiphilic compound	Polarisable agent	Electrolyte	Viscosity modifier
38	3 lauryl alcohol	1 dipentene	—	—
39	5 octyl alcohol	0.5 dipentene	—	—
40	4 lauryl alcohol	1.1 dipentene	—	—
41	3 lauryl alcohol	0.5 dipentene	4 sodium chloride	—
42	3 lauryl alcohol	0.5 dipentene	6 sodium chloride	—
43	3 lauryl alcohol	0.25 dipentene	6 sodium chloride	4 ethanol
44	3 lauryl alcohol	2 dipentene	2 sodium chloride	1 ethanol
45	4 lauryl alcohol	2 dipentene	1 sodium chloride	2 ethanol
46	5 lauryl alcohol	2 dipentene	2 sodium chloride	4.5 ethanol

The following Examples 47—51 illustrate the liquids of excellent clarity.

No.	47	48	49	50	51
Sodium lauryl ether sulphate 3EO	13.0	13.3	13.3	31.0	10
Sodium lauryl sulphate					3
Lauryl alcohol	5	4.3	4.3	3.75	5
Sodium chloride	2.5	2.6	4.3	2	2.5
Dipentene	5.0	6	3	10	5
Ethanol	16	13.5	17	2.5	16
Water	← to 100% →				

The plot of apparent viscosity against shear rate for the mixture consisting of the water, the anionic organic detergent, the amphiphilic compound, the electrolyte and the viscosity modifier is:

Example 47 shear rate (sec.$^{-1}$)	1140	570	380	190	63	42	21	14	7
Apparent viscosity (poise)	0.54	0.63	0.69	0.86	1.03	1.08	1.55	1.74	2.32

Example 49 shear rate (sec.$^{-1}$)	1140	570	380	190	63	42	21	14	7
Apparent viscosity (poise)	0.20	0.23	0.26	0.34	0.38	0.39	0.77	1.16	1.16

The following Examples 52—60, typify the use of the aqueous liquid suspending detergents of the invention for production of stable suspensions of particulate matter.

No.	52	53	54	55	56
Sodium lauryl ether sulphate 3EO	12	—	—	—	—
Sodium lauryl sulphate	—	22.5	12.75	—	14.25
Sodium dodecyl benzene sulphonate	—	—	—	11	—
Lauryl alcohol	4	—	—	—	—
Lauric acid	—	4.5	6	2.25	—
Octanol	—	—	—	—	4.75
Dipentene	1.2	—	—	—	—
Benzene	—	1.6	0.75	0.65	0.85
Sodium chloride	0.8	—	—	—	—
Ethanol	—	4.5	—	—	—
Silica[1]	20	—	—	—	—
Kaolin[2]	—	10	—	—	—
Carborundum 2F[3]	—	—	15	—	—
Calcite[4]	—	—	—	25	—
Encapsulated perfume 0.1 mm	—	—	—	—	5
Water	← to balance →				

All these Examples are stable for at least 3 months without sign of separation.

Particle size

[1] 94%<100μ 26%>53μ 80%>20μ
[2] approx. 2μ
[3] AV. 18μ (70% 13—23μ)
[4] 80% = 30—70μ

No.	57	58	59	60
Sodium lauryl ether sulphate 3EO	20.8	11.1	23.15	10.8
Lauryl alcohol	2.5	3.0	2.8	4.2
Dipentene	1.66	1.33	1.66	4.2
Ammonium chloride	7.5	1.5	—	—
Sodium chloride	—	—	5.55	2.1
Ethanol	6.66	—	2.8	13.33
Kieselguhr	16.66	—	—	—
Feldspar	—	26	—	16.7
Kaolin[2]	—	—	7.4	—
Water	to 100% →			

([2]Particle size approx. 2μ).

WHAT WE CLAIM IS:—

1. A suspending aqueous detergent liquid comprising:

(a) water;

(b) a water soluble anionic organic detergent;

(c) an unionised amphiphilic compound;

wherein (c) is present in amount such that the mixture of (a), (b) and (c) has an apparent viscosity of not less than 0.2 poise at 1100 seconds^{-1} shear rate, and not more than 3.5 poise at 7 seconds^{-1} and has non-Newtonian flow character; and (f) a polarisable organic agent as hereinbefore defined, present in amount such that the resulting liquid has a yield value of at least 2 dynes per sq. cm. measured in the shear rate range of 10^{-2} to 10^{-4} seconds^{-1}.

2. A liquid as claimed in claim 1 comprising water, 10—25% (b), 2—10% (c) and 0.5—3% (f), each by weight of total liquid.

3. A liquid as claimed in claim 1 in which an electrotlyte (d) is included, and (c) is present in amount such that the mixture of (a), (b), (c) and (d) has said apparent viscosity and character.

4. A liquid as claimed in claim 3 comprising water, 5—25% (b), 2—10% (c), 0.5—10% (d) and 0.5—3% (f) each by weight of total liquid.

5. A liquid as claimed in claim 1 in which a viscosity modifier (e) is included, and (c) is present in amount such that the mixture of (a), (b), (c) and (e) has said apparent viscosity and character.

6. A liquid as claimed in claim 5 comprising water, 10—35% (b), 2—10% (c), 0.5—10% (e) and 0.5—5% (f) each by weight of total liquid.

7. A liquid as claimed in claim 1 in which electrolyte (d) and a viscosity modifier (e) are included, and (c) is present in amount such that the mixture of (a), (b), (c), (d) and (e) has said apparent viscosity and character.

8. A liquid as claimed in claim 7 comprising water, 5—35% (b), 2—10% (c), 0.5—10% (d), 0.5—10% (e) and 0.5—5% (f) each by weight of total liquid.

9. A liquid as claimed in claim 7 comprising water, 10—35% (b), 2—10% (c), up to 10% (d), up to 25% (e) and 3—10% (f), each by weight of total liquid.

10. A liquid as claimed in any preceding claim in which (b) is an alkali metal alkyl sulphate.

11. A liquid as claimed in any one of claims 1—9 in which (b) is an alkali metal alkyl sulphate ethoxylated by 1—10 mols ethylene oxide per mole of sulphate.

12. A liquid as claimed in claim 11 in which (b) is sodium lauryl sulphate ethoxylated by an average of 3 mols ethylene oxide per mol of sulphate.

13. A liquid as claimed in any one of claims 1—9 in which (b) is an alkali metal alkyl aryl sulphonate.

14. A liquid as claimed in claim 13 in which (b) is sodium dodecyl benzene sulphonate.

15. A liquid as claimed in any one of claims 1—9 in which (b) is a soap.

16. A liquid as claimed in any one of claims 1—9 in which (b) is an alpha-olefin sulphonate.

17. A liquid as claimed in any of claims 1—9 in which (b) is an alkali metal hydroxy alkyl N - methyl taurate.

18. A liquid as claimed in any preceding claim in which (c) is a saturated fatty acid having 9—15 carbon atoms.

19. A liquid as claimed in claim 18 in which (c) is lauric acid.

20. A liquid as claimed in any one of claims 1—17 in which (c) is a saturated aliphatic alcohol having 8—14 carbon atoms.

21. A liquid as claimed in claim 20 in which (c) is lauryl alcohol.

22. A liquid as claimed in claim 20 in which (c) is octyl alcohol.

23. A liquid as claimed in any preceding claim in which (f) is benzene.

24. A liquid as claimed in any one of claims 1—22 in which (f) is dipentene.

25. A liquid as claimed in any one of claims 3, 4, 7—9 in which (d) is an alkali metal halide.

26. A liquid as claimed in claim 25 in which (d) is ammonium chloride.

27. A liquid as claimed in claim 25 in which (d) is sodium chloride.

28. A liquid as claimed in any one of claims 5—9 in which (e) is an aliphatic alcohol having 1 or 2 carbon atoms.

29. A liquid substantially as described with reference to any one of Examples 1—23, 28—56.

30. A liquid substantially as described with reference to any one of Examples 24—27, 57—60.

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